What Is Claimed Is:

1. A polarization-controlled encoding method comprising the steps of:

splitting an injected optical pulse into two optical pulses traveling along two different paths;

relatively delaying said two optical pulses; and

recombining the delayed pluses in one output path;

wherein said method further comprise a step of phase modulating at least one pulse after said splitting step or recombining step according to a quantum key distribution protocol; and a step of controlling the polarization states of two pulses during the course from the splitting to the recombining to make said polarization states same after recombining before output.

2. The method of claim 1, wherein said step of controlling comprises:

keeping said polarization states of two optical pulses fixedness during the course from the splitting to the recombining.

3. The method of claim 1, wherein said step of controlling comprises:

making said two optical pulses reflected odd times by 90 degree Faraday mirrors separately, and passing them through the same path even times respectively.

4. The method of claim 1, wherein said step of controlling comprises:

making one optical pulse outputted directly and another optical pulse reflected even times by 90 degree Faraday mirrors, and passing the reflected pulse through the same path even times.

5. A polarization-controlled encoder constructed by using the method of claim 1 comprising:

a first polarization-maintained beam splitter for splitting an optical pulse into two optical pulses traveling along two different paths;

a delay line for relatively delaying said two optical pulses;

a second polarization-controlled beam splitter for recombining the delayed pluses in one output path; and

a phase modulator arranged on at least one path of said two different paths and said output path,

wherein said two different paths are polarization-maintained paths.

6. A polarization-controlled encoder constructed by using the method of claim 1 comprising:

a polarization-maintained beam splitter for splitting an optical pulse into two optical pulses traveling along two different paths;

a polarization-maintained delay line arranged on one of said two different paths for relatively delaying said two optical pluses;

at least one mirror for reflecting the delayed pluses to the

polarization-maintained beam splitter to recombine the delayed pulses in one output path; and

a phase modulator arranged on at least one of said two different paths and said output path,

wherein said two different paths are polarization-maintained paths.

7. A polarization-controlled encoder constructed by using the method of claim 1 comprising:

a beam splitter for splitting an optical pulse into two optical pulses traveling along two different paths;

a delay line arranged on one of said two different paths for relatively delaying said two optical pluses;

two 90 degree Faraday mirrors for respectively reflecting the delayed pluses back said beam splitter to recombine the delayed pulses in one output path; and

a phase modulator arranged on at least one of said different paths and said output path.

8. A polarization-controlled encoder constructed by using the method of claim 1 comprising:

a variable polarization-maintained beam splitter for splitting an optical pulse into two optical pulses traveling along two different paths and outputting one optical pulse directly;

a first mirror for reflecting another optical pulse back said variable polarization-maintained beam splitter and passing it through said variable polarization-maintained beam splitter;

a second mirror for reflecting the pulse passed through said variable polarization-maintained beam splitter back, wherein said variable polarization-maintained beam splitter recombines the reflected pulse with the outputted pulse in one output path;

a polarization-maintained delay line arranged on the paths between the first and second mirrors; and

a phase modulator arranged on at least one of said two different paths and said output path,

wherein said paths between the first and second mirrors are polarization-maintained paths.

9. A polarization-controlled encoder constructed by using the method of claim 1 comprising:

a beam splitter for splitting an optical pulse into two optical pulses traveling along two different paths and outputting one optical pulse directly;

a first 90 degree Faraday mirror for reflecting another optical pulse back said beam splitter and passing it through said beam splitter;

a second 90 degree Faraday mirror for reflecting the pulse passed through said beam splitter back, wherein said beam splitter recombines the reflected pulse with the

outputted pulse in one output path;

a delay line arranged on the paths between the first and second mirrors; and

a phase modulator arranged on at least one of said paths between the first and second mirrors and said output path.

10. A quantum key distribution system comprising:

a transmitter side polarization-controlled encoder for splitting an optical pulse emitted from a pulse light source into two optical pulses traveling along two different paths, relatively delaying said two optical pulses and recombining said optical pulses in one output path, wherein at least one of said optical pulses is phase-modulated according to a quantum key distribution protocol;

at least one quantum channel for unidirectional-transmitting said optical pulses output from the transmitter side polarization-controlled encoder;

a receiver side polarization-controlled encoder for receiving said optical pulses from the quantum channel, splitting each of said optical pulses into two optical pulses which form a group and travel along two different paths, relatively delaying said two optical pulses on the basis of said quantum key distribution protocol, and recombining said two optical pulses in one output path, wherein at least one of the received optical pulses, the split optical pulses, the delayed pulses is phase-modulated before recombined in one output path according to said quantum key distribution protocol; and

a single photon detector for measuring at least one superposition interference of two pulses come from different groups and distributing a quantum key according to said quantum key distribution protocol.

11. The system of claim 10, further comprises:

a return photon separating and detecting unit that is added in an output of a transmitter or in an input of a receiver, said return photon separating and detecting unit comprises an optical circulator and a single photon detector, wherein an input port of said unit connects with an output port of said encoder, and an output port of said unit connects with said quantum channel, and a reverse output port of said unit connects with an input port of said single photon detector.

12. The system of claim 11, wherein said return photon separating and detecting unit further comprises a band pass filter arranged before the input of said circulator.